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Association between *Salmonella* Dublin antibodies in bulk tank milk and calf mortality in Danish dairy herds

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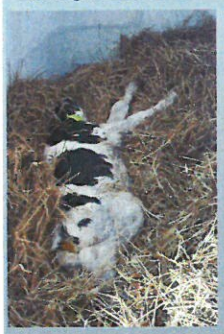
Introduction

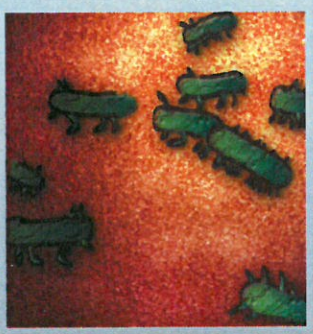
Salmonella Dublin

- Host-adapted to cattle as well as severe zoonosis
- Main risk of introduction: purchase of infected animals or contact to contaminated faecal material
- Risk of creating persistently infected animals
- Welfare concern – mainly in calves (e.g. pneumonia, diarrhoea, arthritis, death).

Objective

- Investigate associations between *Salmonella* Dublin antibody levels in bulk tank milk and calf mortality
- Investigate additional risk factors for calf mortality





Materials and methods

Study design

- Retrospective cumulative cross-sectional study using registry data
- Including all dairy herds with more than 20 cows in Denmark (n=4327)
- Registry data collected from a one-year period: September 2007 to August 2008
- *Salmonella* Dublin antibody level: high (≥25 ODC%) or low (<25 ODC%) in bulk tank milk
- Calf mortality measured as a risk ratio adjusted for days-at-risk of dying

Statistical analysis

- Cut-off for mortality: 2.9% (the national 25% quartile)
- Logistic analysis of risk factors for having >2.9% calf mortality. Backwards elimination.
- 99% confidence limits used for model reduction due to large dataset

Results, Discussion and Conclusion

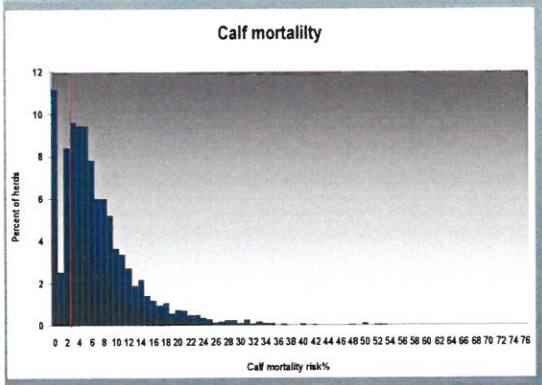


Figure 1: Calf mortality in Danish dairy herds Sept 07 to Aug 08

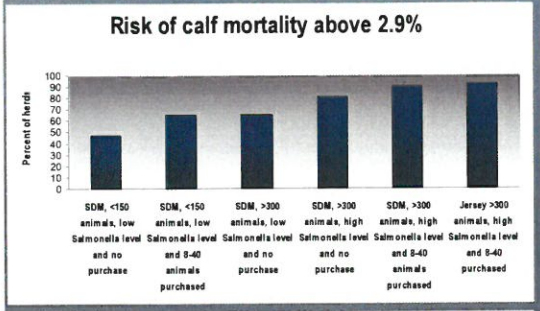


Figure 2: Risk of mortality above 2.9% for 6 different herd types
(SDM= Danish abbreviation for Holstein Friesian breed)

Variables		OR	P-value
Salmonella Dublin antibody level	High vs. low	2.20	<0.0001
Herd size	>150 vs. <150 animals	1.82	<0.0001
	>300 vs. <150 animals	2.14	<0.0001
Purchased animals	1-7 vs. 0 animals	1.37	0.0012
	8-40 vs. 0 animals	2.10	<0.0001
	>40 vs. 0 animals	1.58	<0.0001
Breed*	Jersey vs. Holstein	2.85	<0.0001
	Mixed dairy breeds vs. Holstein	1.38	0.0011
	Jersey vs. Mixed dairy breeds	2.06	<0.0001

Table 1: Risk factors for having a calf mortality risk above 2.9% in study period. Only risk factors significant at 1% significance level are included.
* Breed is classed as Jersey or Holstein Friesian if the herd consists of more than 80% of respective breeds, otherwise the herd is classed as Mixed dairy breeds.

Figure 1 shows the calf mortality in Danish dairy herds in the study period.
In Figure 2, the risks of having a calf mortality above 2.9% are shown for groups of herds with different characteristics. Table 1 shows the factors which are significantly associated with calf mortality.
However, due to the study design one should be careful when drawing conclusions on the causal inference.
The number of dead calves have higher weight in calf mortality calculations in small herds than in large herds.
Therefore, the effect of herd size may be biased in this study.

Conclusion: The study indicates that if *Salmonella* Dublin is controlled nationwide it will lead to lower calf mortality in the dairy sector.

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